

REMARKS

At the outset, the Examiner is thanked for the thorough review and consideration of the pending application. The Office Action dated March 31, 2011 has been received and its contents carefully reviewed.

Applicant also thanks the Examiner for taking the time to speak with Applicant's Representatives on May 24, 2011. The substance of the interview is set forth in these Remarks and constitutes a record of the interview.

Claims 13, 16, 35 and 45 are hereby amended; claims 1-12, 14-15, 17, 19-33 and 35-44 were previously canceled; and no claims are added. Accordingly, claims 13, 16, 18, 34, 35, and 45 are currently pending. Reexamination and reconsideration of the pending claims are respectfully requested.

Claims 13, 16, 18, 34, 35 and 45 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. *Office Action* at p. 2, ¶ 3. Applicant has amended claims 13, 16, 35 and 45 and respectfully request that the Office withdraw the 35 U.S.C. 112, first paragraph rejection of claims 13, 16, 18, 34, 35 and 45.

Claims 13, 16, 18, 34, 35 and 45 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. *Office Action* at p. 6, ¶ 5. Applicant has amended claims 13, 16, 35 and 45 and respectfully request that the Office withdraw the 35 U.S.C. 112, second paragraph rejection of claims 13, 16, 18, 34, 35 and 45.

Claims 13, 16, 18, 34, 35 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No 5,901,399 to Moinpour et al (hereinafter "Moinpour") in view of US Patent No 6,202,658 to Fishkin et al (hereinafter "Fishkin"), US Patent No 6,261,378 to Hashimoto et al (hereinafter "Hashimoto") and the state of the prior art admitted by the applicants in the specification. *Office Action* at p. 8, ¶ 8. Applicant traverses the rejection and request reconsideration.

Independent claim 13 is allowable over the cited references in that claim 13 recites a combination of elements including, for example, “finally jetting deionized water that carries ultrasonic waves with the first and second jetting devices onto the first and second side surfaces of the substrate in order to clean the first and second side surfaces cleaned with the first and second cylindrical brushes after brushing the first and second side surfaces opposite to each other with the first and second cylindrical brushes and after cleaning the upper and lower surfaces of the substrate with the upper and lower brushes.”

Moinpour discloses that ‘[p]articles are removed from the edge 203 of wafer 202 by rotating the wafer in a counterclockwise direction … and simultaneously rotating core 206 such that flexible leaves 208 strike the edge of the wafer.’ *Moinpour* at col. 3, lines 23-24. In other words “as wafer 202 moves through the double sided scrubber system, top-side and bottom-side brushes 230 and 231 clean the top and bottom surfaces of wafer 202, while edge cleaning apparatus 204 removes contaminates along the edge … of the wafer” where “a water jet 235 may be used to propel water into or near the point of contact between the leaves 208 of apparatus 204 and the wafer edge 203.” *Moinpour* at col. 4, lines 19-27 and lines 42-45. In contrast, Applicant claims “finally jetting deionized water that carries ultrasonic waves with the first and second jetting devices onto the first and second side surfaces of the substrate in order to clean the first and second side surfaces cleaned with the first and second cylindrical brushes after brushing the first and second side surfaces opposite to each other with the first and second cylindrical brushes and after cleaning the upper and lower surfaces of the substrate with the upper and lower brushes.” Thus, *Moinpour* does not teach or suggest, at least, these features as recited in independent claim 13.

Fishkin fails to cure the deficiencies of *Moinpour*. *Fishkin* discloses that “while the first and second brushes 51a, 51b scrub the major surfaces of the wafer, the … edge nozzle 35 sprays the liquid jet 45 at the edge E of the wafer W, effectively cleaning slurry residue from the edge E” and “[b]ecause the … edge nozzle is dedicated to cleaning the edge E of the wafer W, the edge E and the major surfaces W₁ and W₂ are simultaneously cleaned without requiring any additional time compared to the time required to clean only the major surfaces W₁ and W₂.[”] *Fishkin* at col. 5, lines 59-64 and col. 6, lines 5-8. In contrast, Applicant claims “finally jetting deionized water that carries ultrasonic waves with the first and second jetting devices onto the first and second side surfaces of the substrate in order to clean the first and second side surfaces

cleaned with the first and second cylindrical brushes after brushing the first and second side surfaces opposite to each other with the first and second cylindrical brushes and after cleaning the upper and lower surfaces of the substrate with the upper and lower brushes.” Thus, *Fishkin* does not teach or suggest, at least, these features as recited in independent claim 13.

The Office purports that “It would have also been obvious to include the referenced spray cleaning before, at the same point or after the brushing with reasonable expectation of adequate results in view of absence of unexpected results achieved by the claimed sequence of the steps.” *Office Action* at p. 9. Applicant disagrees. *Moinpour* and *Fishkin* both disclose cleaning the top and bottom surfaces while cleaning the edge simultaneously. To have included spray cleaning before or after the brushing, as suggested by the Office, teaches against the disclosures of both *Moinpour* and *Fishkin*. Further, the claimed invention provides for many benefits and advantages, for instance, sonar jets or sprays cleaning water onto the side surfaces of the substrate to further clean the side surfaces of the substrate such that foreign substances adhering to the side surfaces of the substrate are completely removed by the high pressure of the cleaning water and the vibration from the ultrasonic waves. *See Specification*, at least, at p. 7, lines 6-11. Hence, a defect ratio caused by the foreign substances during fabrication of the LCD panel is dramatically reduced to improve yield and picture quality deterioration caused by the foreign substances at the side surfaces of the substrate can be eliminated. Applicant asserts that none of the cited references include any teaching or suggestion to “include the referenced spray cleaning before, at the same point or after the brushing, as suggest by the Office. In fact, the only way one of skill in the art would have been able to arrive at the Office’s assertion would have been to use the Applicant’s own specification as a roadmap. Thus, Applicant asserts that the Office has used impermissible hindsight reasoning to arrive at the Applicant’s invention as-claimed.

Hashimoto fails to cure the deficiencies of *Moinpour* and *Fishkin* with respect to independent claim 13. Indeed, the Office only relied upon *Hashimoto* to purportedly disclose “the same method of cleaning are conventionally applied to semiconductor wafers and glass substrates.” *Office Action* at p. 9. Accordingly, none of the cited references, singly or in combination, teaches or suggests “finally jetting deionized water that carries ultrasonic waves with the first and second jetting devices onto the first and second side surfaces of the substrate in order to clean the first and second side surfaces cleaned with the first and second cylindrical brushes after brushing the first and second side surfaces opposite to each other with the first and

second cylindrical brushes and after cleaning the upper and lower surfaces of the substrate with the upper and lower brushes,” as recited in independent claim 13.

Independent claim 45 is allowable over the cited references in that claim 45 recites a combination of elements including, for example “jetting deionized water that carries ultrasonic waves onto the first and second side surfaces of the substrate to secondly clean the first and second side surfaces of the substrate after brushing the first and second side surfaces opposite to each other with the first and second cylindrical brushes and after cleaning the upper and lower surfaces of the substrate with the upper and lower brushes such that the first and second side surfaces cleaned with the first and second cylindrical brushes are secondly cleaned.” For the same or similar reasons discussed above regarding claim 13, nothing in *Moinpour*, *Fishkin* or *Hashimoto* teaches or suggests at least this feature of the claimed invention. Hence, Applicant respectfully asserts that *Moinpour*, *Fishkin* and *Hashimoto* either singly or combined, do not teach or suggest at least the above feature of claim 45, and respectfully submit that independent claim 45 is patentable over *Moinpour*, *Fishkin* and *Hashimoto*.

For at least these reasons, Applicant respectfully requests that the Office withdraw the 35 U.S.C. § 103(a) rejection of independent claims 13 and 45. Claims 16, 18, 34 and 35 depend from independent claim 13. It stands to reason that the 35 U.S.C. §103(a) rejection of those dependent claims should be withdrawn as well.

Claims 13, 16, 18, 34, 35 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over the state of the prior art (hereinafter “SPA”) admitted by the applicants in the *Moinpour*, *Fishkin*, and *Hashimoto*. *Office Action* at p. 10, ¶ 9. Applicant traverses the rejection and requests reconsideration.

Independent claim 13 is allowable over the cited references in that claim 13 recites a combination of elements including, for example, “finally jetting deionized water that carries ultrasonic waves with the first and second jetting devices onto the first and second side surfaces of the substrate in order to clean the first and second side surfaces cleaned with the first and second cylindrical brushes after brushing the first and second side surfaces opposite to each other with the first and second cylindrical brushes and after cleaning the upper and lower surfaces of the substrate with the upper and lower brushes.” The SPA does not teach or suggest, at least, the above features.

Moinpour fails to cure the deficiencies of *SPA*. *Moinpour* discloses that ‘[p]articles are removed from the edge 203 of wafer 202 by rotating the wafer in a counterclockwise direction ... and simultaneously rotating core 206 such that flexible leaves 208 strike the edge of the wafer.’ *Moinpour* at col. 3, lines 23-24. In other words “as wafer 202 moves through the double sided scrubber system, top-side and bottom-side brushes 230 and 231 clean the top and bottom surfaces of wafer 202, while edge cleaning apparatus 204 removes contaminates along the edge ... of the wafer” where “a water jet 235 may be used to propel water into or near the point of contact between the leaves 208 of apparatus 204 and the wafer edge 203.” *Moinpour* at col. 4, lines 19-27 and lines 42-45. In contrast, Applicant claims “finally jetting deionized water that carries ultrasonic waves with the first and second jetting devices onto the first and second side surfaces of the substrate in order to clean the first and second side surfaces cleaned with the first and second cylindrical brushes after brushing the first and second side surfaces opposite to each other with the first and second cylindrical brushes and after cleaning the upper and lower surfaces of the substrate with the upper and lower brushes.” Thus, *Moinpour* does not teach or suggest, at least, these features as recited in independent claim 13.

Fishkin fails to cure the deficiencies of *Moinpour* and *SPA*. *Fishkin* discloses that “while the first and second brushes 51a, 51b scrub the major surfaces of the wafer, the ... edge nozzle 35 sprays the liquid jet 45 at the edge E of the wafer W, effectively cleaning slurry residue from the edge E” and “[b]ecause the ... edge nozzle is dedicated to cleaning the edge E of the wafer W, the edge E and the major surfaces W₁ and W₂ are simultaneously cleaned without requiring any additional time compared to the time required to clean only the major surfaces W₁ and W₂.” *Fishkin* at col. 5, lines 59-64 and col. 6, lines 5-8. In contrast, Applicant claims “finally jetting deionized water that carries ultrasonic waves with the first and second jetting devices onto the first and second side surfaces of the substrate in order to clean the first and second side surfaces cleaned with the first and second cylindrical brushes after brushing the first and second side surfaces opposite to each other with the first and second cylindrical brushes and after cleaning the upper and lower surfaces of the substrate with the upper and lower brushes.” Thus, *Fishkin* does not teach or suggest, at least, these features as recited in independent claim 13.

Hashimoto fails to cure the deficiencies of *Moinpour* and *Fishkin* with respect to independent claim 13. Indeed, the Office only relied upon *Hashimoto* to purportedly disclose “the same method of cleaning are conventionally applied to semiconductor wafers and glass

substrates.” *Office Action* at p. 9. Accordingly, none of the cited references, singly or in combination, teaches or suggests “finally jetting deionized water that carries ultrasonic waves with the first and second jetting devices onto the first and second side surfaces of the substrate in order to clean the first and second side surfaces cleaned with the first and second cylindrical brushes after brushing the first and second side surfaces opposite to each other with the first and second cylindrical brushes and after cleaning the upper and lower surfaces of the substrate with the upper and lower brushes,” as recited in independent claim 13.

Independent claim 45 is allowable over the cited references in that claim 45 recites a combination of elements including, for example “jetting deionized water that carries ultrasonic waves onto the first and second side surfaces of the substrate to secondly clean the first and second side surfaces of the substrate after brushing the first and second side surfaces opposite to each other with the first and second cylindrical brushes and after cleaning the upper and lower surfaces of the substrate with the upper and lower brushes such that the first and second side surfaces cleaned with the first and second cylindrical brushes are secondly cleaned.” For the same or similar reasons discussed above regarding claim 13, nothing in *Moinpour*, *Fishkin* or *Hashimoto* teaches or suggests at least this feature of the claimed invention. Hence, Applicant respectfully asserts that *Moinpour*, *Fishkin* and *Hashimoto* either singly or combined, do not teach or suggest at least the above feature of claim 45, and respectfully submit that independent claim 45 is patentable over *Moinpour*, *Fishkin* and *Hashimoto*.

For at least these reasons, Applicant respectfully requests that the Office withdraw the 35 U.S.C. § 103(a) rejection of independent claims 13 and 45. Claims 16, 18, 34 and 35 depend from independent claim 13. It stands to reason that the 35 U.S.C. §103(a) rejection of those dependent claims should be withdrawn as well.

The application is in condition for allowance. Early and favorable action is respectfully solicited.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at (202) 496-7500 to discuss the steps necessary for placing the application in condition for allowance. All correspondence should continue to be sent to the below-listed address.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to Deposit Account No. 50-0911.

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